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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/138,429	08/24/98	HASHIM I	AMAT/2406/MD

IM62/1017

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EXAMINER	
MERCADO, J	
ART UNIT	**PAPER NUMBER**
1745	9

DATE MAILED: 10/17/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

File Copy

Office Action Summary

Application No.	Applicant(s)
09/138,429	Hashim et al.
Examiner	**Group Art Unit**
Julian A Mercado	1745

☒ Responsive to communication(s) filed on *Jul 28, 2000*

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) *1-3, 5, 15, 16, and 18-20* is/are pending in the applicat

Of the above, claim(s) _____ is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-3, 5, 15, 16, and 18-20* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

1. This Application is responsive to Applicant's amendment filed July 28, 2000.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-3, 5, 6, 15, 16 and 18-20 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1 and 15 have each been amended to recite a "stationary" magnetic field. No support, either literal or illustrative, was found in the original disclosure for the instant limitation. Applicant argues for patentability with the instant limitation, but provides no support to the original disclosure so that the scope of protection sought can be ascertained by reference to the description. Thus, the instant "stationary" magnetic field is considered to be new matter.

In the event of an oversight by the examiner, clarification is requested in response to this Office Action.

Claims 2, 3, 5, 6, 16, and 19-20 are rejected under 35 U.S.C. 112, first paragraph, as being dependent upon a rejected base claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tepman (U.S. Pat. 5,380,414).

Tepman '414 teaches a sputtering chamber containing a target [2], a substrate [4] having a surface that is separated from the target, and a collimator [3] positioned between the target and the substrate and reasonably presumed to be grounded for the reasons discussed in the previous Office Action. A magnet array [11] is disposed within the chamber to form a magnetic field at the surface of the substrate. (Col. 5 lines 23-28) The magnetic field is reasonably presumed to be substantially parallel at the surface of the substrate since the flux lines of a magnetic field are known to conform with the shape of an intervening surface. Within the plain meaning of "annular", the magnetic array is considered to be in an annular configuration such as shown in the magnetic array being in the form of hemispherical "U-shaped" closed loops. Webster's

definition of annular is "of relating to or forming a ring." Additionally, the magnetic array is believed to be annular in shape such as in the opposing magnetrons [11] coming out of the plane of the page and forming a closed circular ring. Of note, Figure 2 which shows the magnetic array [11] appears to be a sectional view.

6. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tepman as discussed for claim 1 above, in view of Hsu (U.S. Pat. 5,589,039).

The teachings of Tepman are discussed above. Of note, claim 1 is further rejected as being unpatentable over Tepman in view of Hsu for the reasons to follow.

Tepman does not explicitly teach a target comprising a magnetic material which retains its magnetic properties upon deposition. However, Hsu specifically teaches that the domains of a magnetic sputtered target [21] are aligned during deposition with application of a substantially parallel magnetic field. (Col. 1 lines 43-52 and col. 5 lines 49-53) Thus, it would have been obvious to one of ordinary skill in the art that a target of magnetic material would retain its magnetic properties upon deposition because of the effects of the substantially parallel magnetic field thereon. Further, it would have been obvious to one of ordinary skill in the art to modify Tepman's invention by employing a magnetic target in order to deposit a corresponding magnetic thin film.

Regarding claim 1, although an annular magnetic array is not necessarily required to be circular as defined by Webster's dictionary, Applicant is noted to submit that circular magnet

arrays are well-known. (Specification p. 1 lines 3-12) The motivation for using a circular magnetic array ring would be to form a symmetrical magnetic field around a circular substrate. In Hsu, for example, a circular target is disclosed which is *symmetrical* with the substrate. The substrate is therefore reasonably presumed to also comprise a circular shape, or at least would be obvious to one of ordinary skill in the art. (Col. 5 lines 24-27) Figure 5 also illustrates a wafer which is circular in shape.

7. Claims 3, 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tepman in view of Hsu as discussed for claim 2 above, and further in view of Boys *et al* (U.S. Pat. 4,500,409) and Applicant's admitted prior art.

The teachings of Tepman and Hsu are discussed above.

Tepman does not explicitly teach a long throw distance of at least 50 mm or a Ni/Fe alloy for the target. However, Boys teaches a long throw distance equal to 2.5 in or 63 mm. (Col. 12 line 37) as well as a Ni/Fe alloy, which is known in the art as Permalloy. (Col. 12 line 23) Thus, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to further modify Tepman's invention by employing a long throw distance of at least 50 mm in order to enhance the deposition rate and uniformity. It would have also been obvious to use Ni/Fe as the target material as this material is well-known and its use would have been motivated for reasons such as commercial availability and well-known performance for a magnetic film material.

8. Claims 15, 16 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alex (U.S. Pat. 5,616,218) in view of Boys *et al* and Tepman. Ghanbari et al.

The teachings of Boys and Tepman are discussed above.

As a primary reference, Alex teaches a collimator [46] positioned between a target [43] and a substrate [49]; the collimator is reasonably presumed to be grounded for the reasons discussed in the previous Office Action.

Alex does not explicitly teach a pressure of less than about 5 mTorr or a T/S distance of at least about 50 mm. However, Boys teaches a pressure of 4 mTorr for the sputtering of a magnetic target. (Col. 12 line 35) In addition, Boys teaches a T/S distance equal to 2.5 in or 63 mm. (Col. 12 line 37) Thus, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to modify Alex's invention by employing a pressure of less than 5 mTorr for reasons such as enhancing the sputtering efficiency and uniformity, as taught by Boys. A T/S distance of at least 50 mm would have also been an obvious modification for the skilled artisan in order to enhance the deposition rate and uniformity.

Alex does not explicitly teach a Ni/Fe target. However, as Alex's invention is for sputtering of a magnetic thin film, the use of a Ni/Fe target such as Permalloy would have been obvious to the skilled artisan for reasons such as commercial availability and well-known performance for a magnetic film material. See, for example, Boys *et al* in column 12 line 23.

Alex does not explicitly teach a substantially parallel magnetic field to the substrate surface using an annular magnet array. However, as discussed above, Tepman teaches a magnet array for forming a substantially parallel magnetic field, and which is also believed to be of annular shape. Thus, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to modify Alex's invention by providing a substantially parallel magnetic field at the surface of the substrate during sputtering. The motivation for such a modification would be to align the magnetic domains of the sputtered film. An annular magnetic array would have been obvious as annular arrays are well-known to the skilled artisan, and in order to form a symmetrical magnetic field around a correspondingly shaped, e.g. circular substrate.

Response to Arguments

9. Applicant's arguments filed July 28, 2000 have been fully considered but they are not persuasive.

Applicant submits that the prior art relied upon are devoid of an annular magnet array to form a stationary magnetic field that is substantially parallel to the substrate surface. However, Tepman as relied upon above is considered to teach an annular magnet array both within the plain meaning of the term "annular", and in consideration of the sectional view showing the magnet array in the form of a circle. The magnet array is believed to be annular, or more specifically circular, because circular substrates or wafers are conventionally used in the art, thus

the magnet array disposed thereunder is reasonably presumed to correspond in shape. For the reasons discussed under section 112, first paragraph, discussion above, Applicant's claim for a stationary magnetic field appears unsupported. However, the prior art teachings of a magnetic field are considered to be stationary, as the magnet arrays which form the magnetic fields are similarly stationary in fixture. The magnetic poles or magnetrons are not disclosed in the prior art teachings to be moving.

Conclusion

10. The prior art relied upon in this Office Action will not be provided since it is the same prior art made of record in the previous Office Action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julian A. Mercado whose telephone number is (703) 305-0511.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisors, Steve Kalafut and Carol Chaney, can be reached on (703) 308-0433 and (703) 305-3777, respectively. The official fax phone number for the organization where this application or proceeding is assigned is (703) 305-3599. The unofficial fax number is (703) 306-3429.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

jam/October 12, 2000

STEPHEN KALAFUT
PRIMARY EXAMINER
GROUP 1700